



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/806,416 | 03/23/2004 | Mitsuaki Hirokawa | Q80574 | 2263 |
| 23373 | 7590 | 10/23/2006 | EXAMINER | |
| SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037 | | | MENON, KRISHNAN S | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1723 | |

DATE MAILED: 10/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/806,416

Applicant(s)

HIROKAWA ET AL.

Examiner

Krishnan S. Menon

Art Unit

1723

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 October 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 1-3 are pending as originally filed

Claim Rejections - 35 USC § 103

Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 02/051528, or Schmidt (US 6,352,641).

WO teaches low pressure drop spiral wound modules for applications such as reverse osmosis or ultrafiltration as claimed – see example 5.

Schmidt teaches a spiral wound element as seen in the figures and column 1 lines 8-38. Figure 2 of Schmidt also shows multiple wraps of the permeate spacer material around the core as claimed.

The references do not specifically teach that the effective perforation area (area of perforations multiplied by the open area of one round of permeate spacer around the core) is at least equal to the cross-sectional area of the tube. However, this factor can be optimized for lowest pressure-drop without compromising the strength of the core tube. Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. In re Boesch and Slaney, 205 USPQ 215 (CCPA 1980); In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977); “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). This factor is also commonly used in designing perforated tubes or cores, as seen in the reference Haq et al (US 6,702,941) (column

26, lines 34-55, which teaches that perforated area should be at least equal to the cross-sectional area of the inlet tube to avoid perforations restricting the flow).

Response to Arguments

Applicant's arguments filed 10/6/06 have been fully considered but they are not persuasive.

Applicant's argument for both the references are the same, that the references do not teach the specific dimensions of the central tube, tube perforations, and the % opening of the permeate spacer wrapped around the tube. Therefore, applicant concludes that the reference does not teach what is claimed.

The examiner agrees that it is difficult for the examiner to show anticipation in this instance, because, even though there are multitudes of references that teach spiral wound membranes with permeate tube, wherein the permeate spacer is wrapped around the permeate tube at least one round, and wherein the permeate tubes have perforations or slots to carry the permeate into the tube, but none of the references specifically state the size of the tube, the length of the tube, the number and sizes of the perforations, or the percent openings of the permeate spacers. The commonly used permeate spacer material is the tricot weave material, which is very open. Even if the references do not teach what is claimed in the exact terms, applicant's claims do not have anything novel in them; the % opening through the permeate spacer wrap and the perforations taken together in series would be far more than the cross-sectional area of the permeate tube. It is also a common engineering practice to provide the area of

Art Unit: 1723

perforations of a perforated distribution/collection tube as significantly greater than the cross-sectional area of the tube so that the perforations do not create undue flow resistance (as evidenced by the Haq reference).

Having said that, applicant's claim 1 recites "... the effective perforate part-area as calculated by multiplying the total area of the perforated parts in the core tube by the percentage of openings of one layer of the permeate-side passage material surrounding the core tube is at least 1.0 time the inner cross-sectional area of the core tube".

To prove the point further, the examiner takes the Cruz'528 reference, example 5, as an example.

Example 5 has 14" wide and 36" long membrane. Therefore, the tube length would be at least 14", and the outside diameter is given as 0.6".

Therefore, the outside cross-sectional area of the tube is $(0.6)^2 \pi / 4 = 0.28$ sq.in.

The tube has 14" length. The perforated part of the tube would be within the glue lines. The reference does not provide the exact locations of the glue line on the tube. Therefore, it is conservatively assumed that it is about 2" from the tip of the tube on both ends. Thus the perforated region length of the tube is 10".

Area of the perforated-part of the tube = $10 \times \pi \times 0.6 = 18.8$ sq.in.

The feed spacer, which is wrapped around the tube in example 5, has a very open structure; as high as, or even higher than, 95%. Assuming conservatively that it is only 50% open,

The effective perforated part area = The perforated part area * permeate side passageway material opening = $18.8 \times 0.5 = 9.4$ sq.in.

Art Unit: 1723

Now, this 9.4 sq.in. is a lot greater than the 0.28 sq.in. area of the outer cross-section of the tube. Naturally, the inner cross-section of the tube would be even less than 0.28 sq.in.

Thus, there is more than a prima facie case of obviousness for the claims with respect to the references cited.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krishnan S. Menon whose telephone number is 571-272-1143. The examiner can normally be reached on 8:00-4:30.

Art Unit: 1723

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L. Walker can be reached on 571-272-1151. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Krishnan S Menon
Primary Examiner
Art Unit 1723
10/18/06